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Three things that will affect soybean rust development in the Midwest in the future

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Three things that will affect soybean rust development in the Midwest in the future

by Daren Mueller, Department of Plant Pathology

Survival of the pathogen over the winter on kudzu

One of the underlying reasons soybean rust was not found in the Midwest in 2005 was the light inoculum load heading into the season. While rust was found as far north as Missouri and throughout the Gulf Coast states in 2004, the winter of 2004/05 was particularly cold, killing back any potential overwintering host (kudzu); thus, the rust fungus did not survive except for deep in the Florida peninsula.

As our second winter unfolds, we continue to learn about how soybean rust will survive in the South. Already in 2006, there are reports of infected kudzu in Alabama, Florida, and Georgia. One disturbing trend from some of these reports is that the rust-infected kudzu leaves are north of the "kudzu-freeze line." Kudzu leaves found in Alabama, Georgia, and some in Florida were from patches of kudzu that were supposedly "100 percent dead." However, some green plant tissue remained because part of the vine was protected from cold weather by structures such as culverts or bridges. The remaining green leaves on the two infected kudzu patches in Georgia were destroyed. Also, a killing frost settled as far south as Tampa, Florida, last week, killing much of the new kudzu growth. The possibilities of frost are not over in Florida as the last frost-free date for parts of northern Florida goes to March 15.



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Surviving kudzu patch infected with soybean rust found in Alabama on January 12, 2006. (Ed Sikora)



New kudzu growth infected with soybean rust found in Florida during mid January. (Tristan Mueller)

So what does that mean for producers in Iowa? As soybean rust becomes more widespread throughout the South, there probably will be increasing reports of soybean rust surviving on kudzu. For 2006, there are already more reports of infected kudzu compared to the same time last year, when the first report was not until February 24 in Florida. The good news this winter came out of Texas, where an infected kudzu patch was found and reported in November 2005. Neighboring fields were scouted in January; the kudzu found there was 100 percent dead and no rust was found.

Spore movement to the Midwest

How far can soybean rust spores move? This past winter a couple of separate reports claimed that soybean rust spores were identified in the Midwest. Is this true? Yes!

Two interesting studies investigating spore movement were done this past year. In one study coordinated by the University of Arkansas, spore traps with microscope slides were placed across the eastern United States. The slides were collected once a week and examined for "soybean rust-like spores." In a second study coordinated by the University of

Minnesota, rainwater was collected from National Atmospheric Deposition Program rainfall collectors and analyzed for DNA of *Phakopsora pachyrhizi*, the fungus responsible for Asian soybean rust.



Spore sampler used in the spore movement study. (John Rupe)



Rainfall collector used in the soybean rust spore movement study. (Jim Kurle)

Both of these experiments detected "soybean rust-like spores" or DNA from soybean rust

spores in the Midwest. How are we interpreting these findings? First and most obvious, no disease was found in the Midwest. So, either these spores were not viable (not alive) or the environmental conditions were not conducive for disease development. Let's concentrate on the viability. What we know from other diseases--corn and wheat rust--is that these diseases can move 20 to 30 miles a day, but northward movement greater than 30 miles a day is not common. Hypothetically, spores that travel greater than this distance will not be viable because of too much sunlight (rust spores are sensitive to ultraviolet radiation) or too much time away from a susceptible host.

Where did these spores come from? The spores found in South Dakota and Minnesota were traced back to Texas, and spores found in Texas were traced back to the Yucatan Peninsula in Mexico.

So, what does this mean for Iowa growers this year? If rust becomes established in Texas and/or Mexico, we could see the disease progressing northward earlier in the season than if rust overwintered only in Florida. But don't get overly excited about rust spores being trapped here in the Midwest. Unless spores are coming from a field at least 30 miles from the trap, we do not know if these spores will even be viable. Until spore trapping techniques improve, sentinel plots should provide a more accurate assessment as to when rust will arrive. Regular updates on sentinel plot research will be reported in the ICM Newsletter.

Environmental conditions at the time of spore deposition

Even if soybean rust survives in great numbers on kudzu and the wind patterns push spores quickly north, ideal weather conditions (moderate temperatures with more than 6 hours of leaf wetness) are needed for the disease to become established and impact Midwestern soybean production. Elwynn Taylor, extension climatologist and agronomist, is predicting hot, dry weather conditions. While not good for soybean production, those conditions are even less favorable for soybean rust. Don't let predictions pacify you into a false sense of security for this summer, but keep weather conditions in mind when planning your management strategy.

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